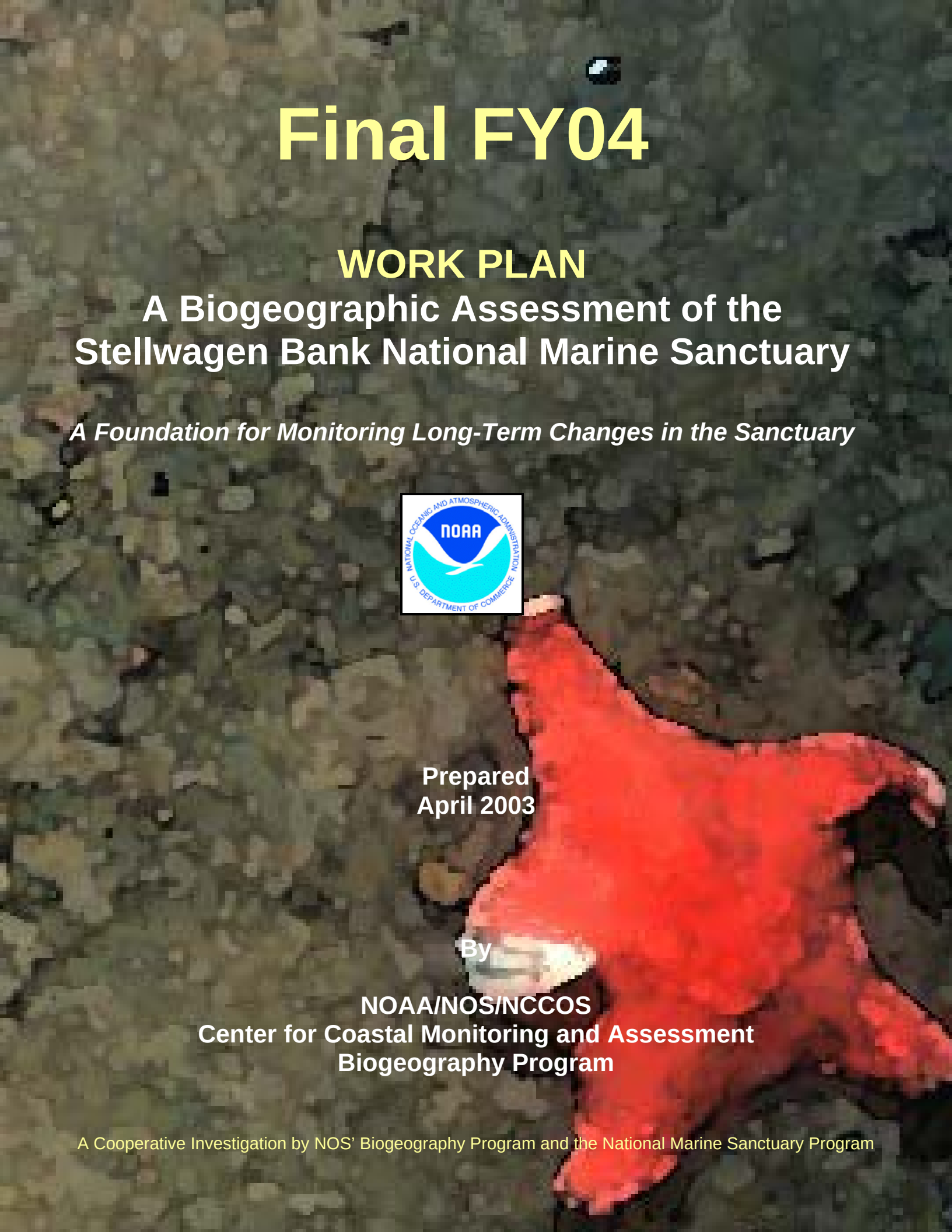
Final FY04

WORK PLAN

A Biogeographic Assessment of the Stellwagen Bank National Marine Sanctuary

A Foundation for Monitoring Long-Term Changes in the Sanctuary



Prepared
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By

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Center for Coastal Monitoring and Assessment
Biogeography Program

A Cooperative Investigation by NOS' Biogeography Program and the National Marine Sanctuary Program

A Biogeographic Assessment of Stellwagen Bank National Marine Sanctuary

A Foundation for Monitoring Long-Term Changes in the Sanctuary

GOAL

The National Oceanic and Atmospheric Administration's (NOAA) Biogeography Program (BP) will collaborate with the National Marine Sanctuaries Program (NMSP) in order to conduct a biogeographic assessment of the marine region surrounding Stellwagen Bank National Marine Sanctuary (SBNMS). This work is intended to 1) support the management plan review process currently underway at the Sanctuary, and 2) provide baseline data for long-term monitoring and for management decision making. Selected biological and physical datasets of the region will be assembled into a GIS that will be used, in part, to inform discussions relating to the management plan review process. Additional datasets will be obtained, evaluated and integrated into a Biogeographic analysis of the Sanctuary and surrounding environs with the goal of identifying areas of ecological importance. As a result of the collaboration, the following products are anticipated 1) a website for the rapid dissemination of scientific data specifically tailored for management plan review discussions, 2) an analysis of the physical oceanographic conditions in the region, and 3) a Biogeographic assessment of key biological and physical relationships within the sanctuary.

BACKGROUND

Stellwagen Bank National Marine Sanctuary (SBNMS) extends from Cape Ann to Cape Cod across the mouth of Massachusetts Bay. Its 843 square miles encompass diverse topographic features, including the submerged areas of Stellwagen Bank and Basin, Tillies Bank and Basin, and the southern portion of Jeffrey's Ledge. Due to its varied seafloor topography and high primary productivity, the area is utilized by diverse assemblages of seabirds, endangered marine mammals, invertebrates, and fish species. It is a region of cultural significance, highlighted by the recent discoveries of several historic shipwrecks. The Sanctuary was designated in 1992 in order to better protect these and other unique biological, geological, oceanographic and cultural features of the region.

The NMSP is currently undertaking the first review of the SBNMS management plan since designation in 1992. This process will enter working group discussions beginning in September 2003. No new regulations have been added since designation, but the information base on the natural resources of the sanctuary has widened due to technological advancements and increased research activity in the region. The biogeographic study of SBNMS will take advantage of new spatial data sets that have recently become available so as to produce an integrative assessment. The integrative assessment will provide a catalyst for management plan review discussions, as well as provide a foundation for future biological studies within the sanctuary.

PROJECT OVERVIEW

The NCCOS Biogeography Program, in consultation with SBNMS and the NMSP, will conduct a spatially-explicit characterization of the physical and biological conditions within Stellwagen Bank NMS ecosystems. Preliminary efforts include the integration of existing coverages (i.e. sediment type, bathymetry, shoreline, and shipping lanes) into a GIS environment with select SBNMS supplied biological and human-use datasets. As working group discussions progress, maps and basic spatial analyses will be conducted on this data as requested by SBNMS staff. BP will generate a website which will provide informational content such as analytical results, scientific material, and working group logistical information to facilitate the productivity of working group meetings. The BP, in consultation with SBNMS science staff, will continue to obtain data on the biology, human use, and physical oceanography of the

area. A characterization of the physical oceanographic conditions of SBNMS will be conducted following an evaluation of the extent and compatibility of available data. Finally, the oceanographic assessment will be analyzed in concert with the biological and human use data sets to examine relationships between oceanography and the temporal and spatial dynamics of the ecosystem.

Questions to be addressed by this study include:

1. What data currently exists on the physical oceanography of SBNMS, and what are the general oceanographic patterns within the sanctuary?

2. Does an analysis of existing data reveal biologically meaningful and statistically significant patterns in the distribution of marine fauna and human activity?

3. How are species distributed spatially and temporally throughout the sanctuary in relationship to topographic, and physical oceanographic features?

4. Which areas or habitats are unique and productive (e.g. high diversity) and how are these areas utilized by living marine resources?

5. What significant gaps exist in our knowledge and information of biological and physical characteristics of the study area?

PROJECT TASKS
Below are brief descriptions of the major tasks planned for this biogeographic assessment. Please refer to the "schedule" section for a timeline for completing the assessment.

Task 1. Work plan and Project Implementation
Estimated Completion Date: May 31, 2003

During early FY 2003, collaborative discussions took place to identify the objectives for a Biogeographic assessment for Stellwagen Bank NMS, and agreements made are described in this document. However, as the project continues to develop and additional discussions are held between BP and SBNMS staff, objectives, tasks and products will continue to be redefined. This work plan should, therefore, be considered an evolving document that will be modified during early project phases to reflect agreed upon refinements. Though specific products are identified here, finalized products will depend on the quality, quantity, and availability of data for analysis. The BP will work closely with SBNMS science staff to ensure that the informational needs of management plan working groups are properly addressed, and that the most appropriate species, oceanographic variables, data sets, and analyses are selected for the biogeographic assessment.

Task 1 Products:
- A preliminary list of deliverables
- A final work plan

Task 2. Working Group Support: Website and GIS
Estimated Completion Date: September 1, 2003

This task is focused on supporting the immediate needs of upcoming management plan review working group meetings and is divided into 3 sub-tasks.

Task 2a: Existing U.S. Geological Survey (USGS) and Technology Planning and Management Corporation (TPMC, SBNMS contractor) coverages of physical and human activity characteristics (i.e. bathymetry, sediment, shipping lanes) will be reconciled into a single GIS database.

Task 2b: SBNMS provided seabird, fish and vessel trip report data will be digitized and/or formatted as needed for integration into the GIS of existing coverages.
Task 2c: As topics arise in working group meetings, queries and simple analyses may be conducted on the assembled GIS to supplement discussions. Pending approval by NMSP headquarters staff, the BP intends to create a website that will make these results available to working group members, and provide other information to support of working group meetings (i.e. appropriate publications, graphics, schedules, meeting summaries). Specific materials will be posted only upon direction from SBNMS staff. The website will be maintained and updated throughout the duration of working group meetings, projected to end in the fall of 2004. Upon conclusion of the working group phase, the BP will continue to maintain the website but its function will shift toward the review of interim products for the larger biogeographic assessment (see task 11).

Task 2 Products:

- Digitized and formatted SBNMS datasets
- Integrated GIS of coverages and datasets
- Working group website

Task 3. Oceanographic Characterization: Identify Contacts and Obtain Data
Estimated Completion Date: February 15, 2004

Data on the physical oceanographic characteristics will be obtained mainly from groups actively working in the region (i.e. academic, government, consulting, nonprofit and other groups). Many of them will be contacted by SBNMS and NMSP staff in relation to working group meetings and other management plan review activities. SBNMS will therefore initiate inquiries regarding oceanographic data holdings, and provide an initial list of contacts by mid January 2004. The BP will follow up on contacts where appropriate. The BP will also investigate the utility of NOS and/or NOAA data holdings to determine if any may be useful for this analysis.

Task 3 Products:

- Initial list of contacts and reports (SBNMS)
- Preliminary data set inventory

Task 4. Additional Data Collection and Formatting
Estimated Completion Date: (quarterly throughout FY 2004)
December 31, 2003; March 31, 2004; June 30, 2004; September 30, 2004

Several additional data sets relevant for the biogeographic analyses are expected to become available continually as SBNMS and collaborators conduct ongoing field activities, and as management plan review discussions progress. Newly collected oceanographic and biological data will be compiled by SBNMS and given to BP at quarterly intervals during FY '04. Data will then be formatted for potential inclusion into either the oceanographic characterization analysis (task 5-6) or for inclusion into the full biogeographic assessment (task 7-8).

Task 4 Products

- Additional data sets formatted for incorporation into biogeographic analyses

Task 5. Oceanographic Characterization: Preliminary Assessment and Selection of Analytical Techniques
Estimated Completion Date: April 15, 2004

Once data sets are obtained they will be formatted and organized into a preliminary database management system (DBMS) and GIS to assess their quality and content. All data acquired and used for the assessment will be standardized by BP staff into a common spatial projection.

With the DBMS and GIS in place, BP staff will evaluate the extent and quality of data, identify where important information gaps may exist, and select analytical techniques that are most appropriate given the data collected and the desired products. Certain data sets may be synthesized in order to create complete data layers that span the study area. The BP will determine if and where independent databases can be integrated or synthesized into new databases that support the analyses. The variety and limitations of the various data sets are expected to have a major influence on the character of the oceanographic characterization. A preliminary approach to analysis will be presented to SBNMS staff and local experts for comment and approval. Once the analytical approach has been identified, all data will be migrated into the appropriate DBMS and GIS format to conduct the biogeographic assessment.

Task 5 Products:

- Summary report describing preliminary data collection and assessment.
- Standardized spatial data compendium (DBMS-GIS).

Task 6. Oceanographic Characterization: Analysis

Estimated Completion Date: October 1, 2004

The BP staff will conduct a biogeographic characterization of physical oceanographic features throughout the region. SBNMS will assist BP in identifying an appropriate contractor with expertise in regional and local physical oceanographic conditions. As indicated in task 5, the nature of these analyses will depend on the content of oceanographic data sets collected, and on features considered to be of key ecological importance by SBNMS science staff and experts. Oceanographic data and analyses will be integrated into a DBMS and GIS for later biogeographic analysis with biological and human activity data sets described in task 7.

Task 6 Products:

- Summary report describing oceanographic assessment.
- Quantitative and qualitative assessments describing physical oceanographic patterns in the study area.
- Project database of physical oceanographic data.

Task 7. Biogeographic Assessment: Preliminary Assessment and Selection of Analytical Techniques

Estimated Completion Date: December 1, 2004

Biological and human activity data sets collected and formatted in support of working groups (task 2) and obtained by SBNMS science staff during 2004 (task 4) will be organized into a preliminary database management system (DBMS) and GIS to assess their collective quality and content. The data utilized during task 7 will be examined in concert with the results of the oceanographic characterization. The BP, in consultation with SBNMS science staff, will then select a preliminary list of analytical techniques proposed for a biogeographic assessment that will examine relationships between oceanographic conditions and species' spatial and temporal distributions in SBNMS. It is anticipated that the proposed approach to analysis will then be presented to SBNMS science staff and relevant experts for comment and approval in November 2004. As with the oceanographic characterization described in tasks 5 and 6, the specific nature of the full biogeographic assessment will depend heavily upon, and may be limited by, the extent, quality, and compatibility of data sets obtained.

Task 7 Products:

- Inventory list of appropriate oceanographic, human activity and biological data sets.
- GIS DBMS of biological and human activity data.
- Plan for analytical techniques that will be used in the biogeographic analysis.

Task 8. Biogeographic Assessment: Data Analysis
Estimated Completion Date: March 15, 2005

The BP staff will conduct a set of biogeographic analyses to identify areas and time periods of key biological and oceanographic importance based on the following criteria: recommendations received during task 7; the availability of data sets; species distributions; species life history requirements and habitat affinities; the distribution of bio-physical habitats; and measures of community structure (e.g., species diversity). All data will be integrated into a spatially-explicit index in an attempt to evaluate overall spatial patterns. This index will be defined after we have a complete inventory of the data available and appropriate for analysis. An example index might include an integrated spatial estimate of biological "hot spots" using parameters of community structure for multiple taxa (e.g., species diversity and evenness for birds, fishes, mammals, etc.).

Task 8 Products:

- Quantitative and qualitative results that identify biogeographic patterns and bio-physical interrelationships of single species, species assemblages, and measures of community structure within the study area defined by available data.
- Quantitative and qualitative assessments describing the physical and oceanographic character within the study area.

Task 9. Development of Products for Review
Estimated Completion Date: June 15, 2005

Draft species, habitat, and analysis maps (e.g. species richness, diversity) coupled with statistical results will be made available to NMSP staff, interested members of the SAC, and other experts for review in a workshop format anticipated in mid-June 2004. A list of specific questions and comments will be provided to reviewers to obtain feedback on specific areas of the analysis.

Task 9 Products:

- Interim analytical results (e.g. maps).
- A list of comments and questions for reviewers.
- A map and/or list of data gaps.
- Brief status report.

Task 10. Incorporate Review Comments and Present/Deliver Final Results
Estimated Completion Date: October 15, 2005

Once products have been reviewed by selected SBNMS/NMSP staff and other experts, the BP staff will incorporate review comments and prepare final products. The final product will be similar in format and intent to the assessment produced by the BP for the north/central California Marine Sanctuaries. However, its scope and content will be limited by the personnel, financial, and data resources available. Presently, it is anticipated that the assessment for Stellwagen Bank NMS will be similar in design to the BP product produced for the north/central California Marine Sanctuaries, but smaller in scope and complexity.

Task 10 Products

- A final report and atlas presenting maps and descriptions of analyses, results, and interpretation of the results.
- A GIS on species, habitats, and important biological areas in the study area.
- A DBMS with data and information on species and habitats.
- A map and/or list of data gaps.

Task 11. Web Site for Working Groups and the Biogeographic Assessment
Estimated Completion Date: Ongoing throughout the duration of the project

Pending approval of NMS headquarters staff, the BP will create, maintain and continually update a website for the tasks described in this work plan. Initially, it will support management plan review working groups by providing analyses, summary data, publications, meeting summaries, schedules and other materials relevant to discussion topics. Given the highly political nature of these discussions, items will be posted only upon specific direction by SBNMS science staff, and portions may be secured (i.e. password protection, I.P. address verification, etc.). As working groups end in the fall/winter of 2004, BP will continue to support the website, however its focus will shift towards disseminating interim analyses, and interim and final maps and products of the larger SBNMS biogeographic assessment.

PROJECT PERIOD
November 2002 through October 2005

PROJECT TEAM
The Biogeography Team of the National Centers for Coastal Ocean Science (NCCOS) will lead this collaborative effort. Other project members include staff from the Office of National Marine Sanctuaries and the Stellwagen Bank National Marine Sanctuary.

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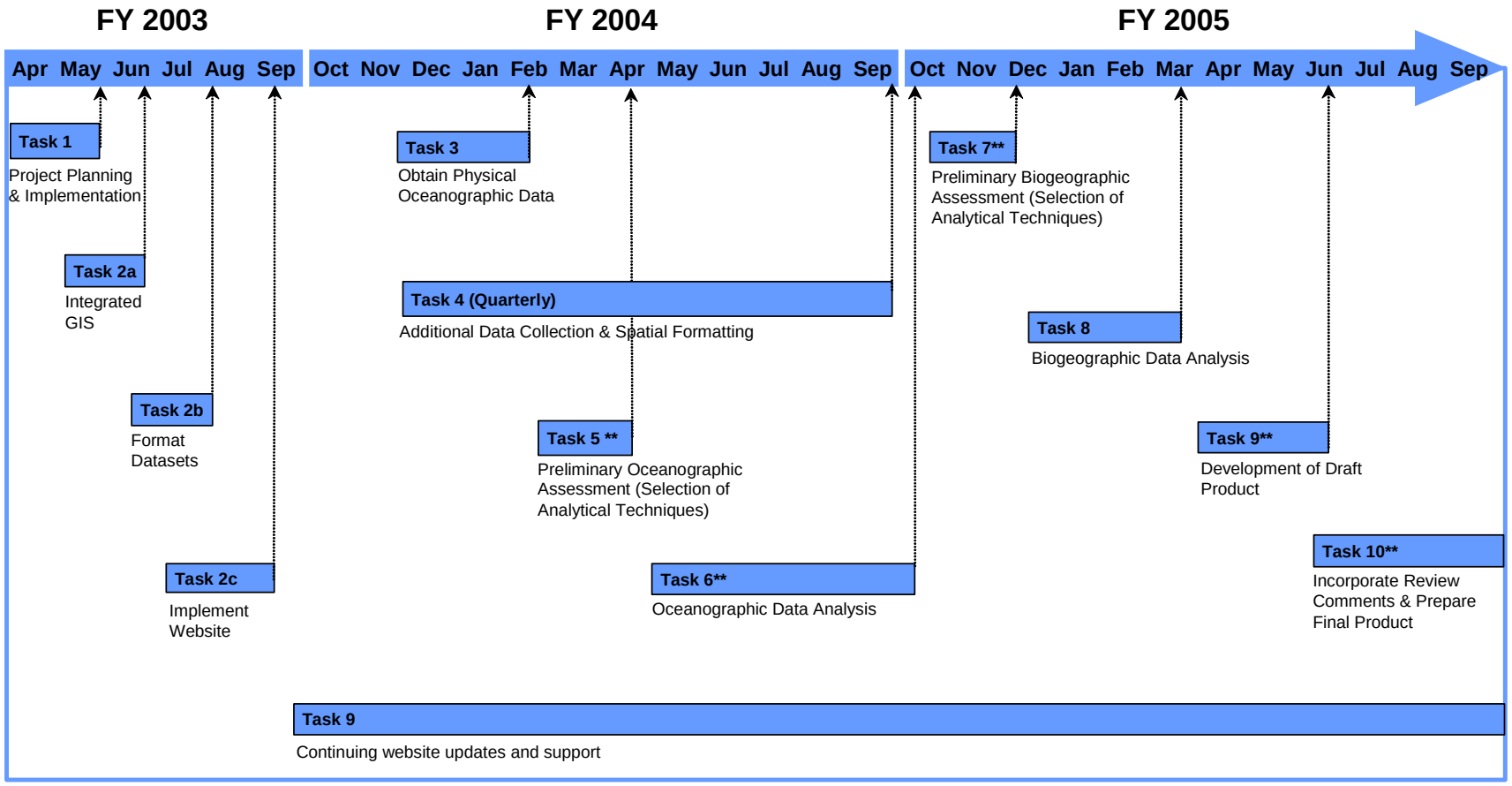
SCHEDULE



**Asterisks denote anticipated site visit by BP staff, or workshop with SBNMS, BP and collaborator attendees.

BUDGET AND PERSONNEL ALLOCATIONS

Table 1. Anticipated project budget (in thousands of dollars). Numbers in bold indicate FY03 expenditures, numbers in italics indicate FY04 and FY05 expenditures (also denoted with asterisk).

	Contract Labor	Travel	Supplies and Equipment	TOTAL	
Task 1: Project Planning	**23**	**2**	**0**	**25**	**FY 03**
Task 2: Working Group Support	**33**	**2**	**1**	**36**	
Task 3: Oceanographic Data Collection***	15	0	0	15	**FY 04*** **
Task 4: Additional Data Formatting***	15	0	0	15	
Task 5: Preliminary Oceanographic Assessment***	22	4	1	27	
Task 6: Oceanographic Analysis***	25	4	2	32	
Task 7: Preliminary Biogeographic Assessment***	10	3	0	18	**FY 05*** **
Task 8: Biogeographic Analysis***	15	1	1	22	
Task 9: Draft Product***	15	3	4	27	
Task 10: Final Product***	15	3	9	32	
Task 11: Website Maintenance*	0	0	5*	5	**All**
FY 03 Totals	59	7	3	70	
FY 04 Totals	77	8	5	90	
FY 05 Totals	55	10	15	80	
GRAND TOTAL	**191**	**25**	**23**	**240**	

*Website maintenance costs are distributed as follows: FY'03 = $2K, FY '04 = $2K, FY '05 = $1K
***Funding for FY05 contingent on continued MNSP/NCCOS support.

BUDGET AND PERSONNEL ALLOCATIONS (CONTINUED)

Table 2. Personnel allocation by task item. An "X" denotes expected participation in the task. Names in italics (also denoted by asterisk) indicate NCCOS contract personnel that relate back to contract costs in table 1. Percent of time per person is listed in the right column. Base rate for calculating contract cost is $135 K/year for one FTE (includes salary, benefits, overhead, and travel for one GS-12 equivalent).

	Task 1: Project Planning	Task 2: Working Group Support	Task 3: Oceanographic Data Collection	Task 4: Additional Data Formatting	Task 5: Preliminary Oceanographic Assessment	Task 6: Oceanographic Analysis	Task 7: Preliminary Biogeographic Assessment	Task 8: Biogeographic Analysis	Task 9: Draft Product	Task 10: Final Product	Task 11: Website Maintenance	Percent of Time
Tim Battista	X	X	X	X	X	X	X	X	X	X	X	20%
Randy Clark							X	X	X	X		15%
Ken Buja						X		X	X	X		10%
Michael Coyne											X	10%
Chris Jeffrey							X	X	X	X		10%
Mark Monaco	X	X			X	X	X	X	X	X		5%
*Ann Borowik**		X	X	X			X	X	X	X		30%
*Olaf Jensen**				X	X		X	X	X			20%
*Lynn Takata**	X	X	X		X			X	X	X		30%
Oceanography Contractor (TBD)			X	X	X	X						100%

Craig MacDonald												
James Lindholm												
David Wiley												
John D. Crawford												